Knowledge Transfer as Isomorphism: Diffusion of Administrative Innovation in the International Civil Aviation Domain

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***Abstract*—In past studies on knowledge transfer, a latent assumption exists that organizations transfer knowledge with their own intention or will. Therefore, many studies have examined how the motivation by stakeholders influences knowledge transfer. This assumption is valid for the cases of private corporations acting for economic benefit. However, for public organizations such as government agencies, economic benefit is not the main driver of their behavior. They transfer and implement knowledge and technologies for other reasons. Therefore, a different perspective should be applied to theories on knowledge transfer by public organizations. Hence, new institutionalism could provide a perspective that could explain why and how public organizations transfer knowledge. In this study, a case in the civil aviation domain for knowledge transfer involving both public and private organizations is analyzed. The results found a difference in the motivation for knowledge transfer between public organizations and private organizations. It was also found that this case can be explained as a process of coercive isomorphism. Based on these findings, implications for further studies are provided.**

***Index Terms*—Knowledge transfer, diffusion of innovation, isomorphism, coercion, public organization.**

I. Introduction

Many researchers assert that in modern businesses, knowledge is the source of competitive advantage [1], [2]. Knowledge is even regarded as the most important means of production [3]. However, as knowledge rapidly becomes obsolete, it is essential to continuously obtain and apply useful knowledge [4]. Therefore, in the domain of management science, various studies have been conducted on knowledge transfer between organizations since the 1990s. In these studies, factors that could improve or prevent knowledge transfer have been examined.

Among those factors influencing knowledge transfer is the motivation for knowledge transfer by recipient organizations. As to the motivation, it is to be noted that these studies are based on a latent but fundamental assumption that organizations transfer knowledge intentionally or willingly.

From a different angle, organizations are also influenced by the environmental factors surrounding them. Such factors include social institutions such as laws, regulations, norms, etc. Meyer and Rowan asserted that organizations determine their organizational structure and technologies to be implemented as a result of the influence of those environmental factors [5].

With this perspective emphasizing the influence of environmental factor than organizations' intention, it is foreseen that knowledge transfer may be explained as an institutional isomorphism, a process in which organizations in a given environment (referred to as an "organizational field" [6]) resemble each other. In this study, a case of knowledge transfer in the civil aviation domain is analyzed to examine if the knowledge transfer could be explained as a process of institutional isomorphism.

For this purpose, the next section begins with a review of past studies. Then, in Section III, the details relating to the data collection and analysis in this study are presented, as is the explanation of the research site. Finally, as a conclusion, the findings, implications, and limitations of this study are indicated.

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II. Review of Past Studies

This chapter provides a review of past studies on knowledge transfer for a better understanding of the background of this study. The main aspect reviewed here is the motivations that drive organizational knowledge transfer. Next, an overview of the concept of isomorphism is provided. An overview of the theory of public organizations follows as preparation for the discussion. Finally, the limitations of past studies and research questions of this study are outlined.

A. Motivation for Knowledge Transfer

Knowledge transfer involves various components such as source of the knowledge (sender), recipient of the knowledge, the relationship between source and recipient, the knowledge itself, channel of transfer, and the overall context [7]. By incorporating characteristics of these components, past studies on knowledge transfer have analyzed the factors that influence the efficiency and effectiveness of knowledge transfer.

Characteristics of recipient organizations, in the work of past researchers, have been regarded as important factors that influence the efficiency and effectiveness of knowledge transfer. Therefore, in past studies, various characteristics have been examined such as recipients' motivation [8], [9], absorptive capability [10], commitment by management [11], and the position of the recipient in the knowledge transfer network [12].

Among these, the effect of recipients' motivation is one of the factors that have been studied by the most researchers (e.g., [8], [9], [11]). In these studies, motivation has been measured using Likert scale questionnaires. For example,

Gupta and Govindarajan measured motivation as an economic incentive using a questionnaire on which questions were asked along a 7-point Likert scale [11].

At this time, by examining these studies carefully, a general tendency can be found that the interests of past researchers are based on a latent assumption that organizations transfer knowledge by their own intention or will. Of course, it would be natural to recognize that recipients with more motivation would achieve better knowledge transfer.

However, the proposition that organizations without motivation will not acquire sufficient knowledge will not be valid. That is, another model can be assumed that organizations transfer knowledge driven not only by their will but also by some pressure from the environment. This model can be well explained by the concept of *isomorphism*, as discussed in the next section.

B. Isomorphism

As discussed in the previous section, past studies on knowledge transfer implicitly assume that organizations transfer knowledge intentionally and autonomously. That is, recipient organizations try to acquire new knowledge as they wish to have it and apply it to their operations to improve their outcomes.

However, for researchers of the new institutionalism, organizational behavior is prescribed by the environment rather than by the organization's intentions themselves. This perspective may provide a different explanation of knowledge transfer from those of past studies in some cases. To be specific, the diffusion of innovation or new technology can be regarded as a result of an *institutional isomorphism* in which organizations in a given organizational field resemble each other.

Prior to a detailed discussion, it would be beneficial to summarize the basic theory of new institutionalism and isomorphism.

Dimaggio and Powel [6] explain why and how organizations get homogenized using the concept of institutional isomorphism. Isomorphism is a process in which organizations in a given organizational field come to resemble each other. According to these authors, there are three types of institutional isomorphism: *coercive isomorphism*, *mimetic isomorphism*, and *normative isomorphism.*

Coercive isomorphism is caused under pressure by other organizations higher up in the hierarchy. The pressure could be formal, such as by formal laws or regulations established by the government, or informal, such as cultural/societal expectations. In either case, institutional rules and socially recognized values and norms have an influence on the structures and technologies implemented by organizations [5]. One example is when organizations implement a common accounting rule in order to meet legal requirements [6]. Another example is subsidiaries that implement similar practices compatible with the policies and practices of their parent organizations [6].

This type of isomorphism may appear even when the organizations in the organizational field do not have formal relationships. It also happens when organizations have to implement infrastructures mandated by monopolistic corporations. For example, it is difficult for many organizations to use operating systems (OS) for their personal computers different from those widely used as the *de facto* standard. Most organizations tend to use the same OS to avoid difficulties. As such, coercive isomorphism arises, especially when organizations are not independent from other organizations, by law, by corporate governance, or monopolies.

Mimetic isomorphism occurs when organizations imitate other organizations that are recognized as being successful. Uncertainty in the market and a lack of model organizations enhances this form of isomorphism. According to DiMaggio and Powel, imitation of Japanese production systems, such as the Toyota system, by American manufacturers can be explained as mimetic isomorphism [6].

The third type of isomorphism is *normative isomorphism*. This stems from professionalism. There are two types of normative isomorphism. One is the result of formal higher education, and the second occurs through the growth and sophistication of professional networks. Under the influence of education and networks, employees of different companies in the same profession tend to indicate similar behaviors, ways of thinking, etc.

The progress of isomorphism is influenced by various factors. Among these factors is the frequency of transactions with government agencies [6]. The more frequently organizations in the organizational field interact with the government agencies governing the field, the more the organizations come to resemble each other as a result of their efforts to comply with the rules and policies established by the government.

Public organizations [12], including government organizations, are the typical examples of this type of isomorphism because transactions with government agencies, or international organizations, as organizations that are higher in the hierarchy, are essential for their operation. Therefore, to test the perspective that knowledge transfer is a process of isomorphism, it will be beneficial to examine knowledge transfer by public organizations, which is the main scope of this study. However, prior to the main analysis, in order to provide the basics of this study, characteristics of public organizations are elaborated in the next section.

C. Public and Private Organizations

As discussed above, during the process of isomorphism, government agencies influence other organizations. While government agencies influence other organizations, they are also influenced by other government agencies. This implies that government agencies are also likely to be involved in the process of isomorphism.

Organizations, including government agencies and private corporations, can be classified into public organizations and private organizations [13]-[15]. It is difficult to define the clear border between public and private organizations because of their diversity [15]. However, the difference between these two types of organizations can be characterized by their relationships with the public interest, the market, and the sources of their income. Based on these viewpoints, a tentative classification can be set: public

organizations are those oriented toward the public, and private organizations are those oriented toward themselves. Therefore, government agencies can be classified as public organizations.

The differences in the fundamental orientations of these two types of organizations will generate the differences in their knowledge transfer characteristics. As a part of this predication, it is foreseen that the factors that enhance knowledge transfer may be different between them. In addition, it is also foreseen that certain aspects of isomorphism will be more notable in knowledge transfer by public organizations.

In order to test these assertions, examining knowledge transfer by public organizations will be essential. However, among the studies reviewed by the author, most analyze knowledge transfer between private corporations. The typical scheme is from a parent corporation to its subsidiaries (e.g., [16], [17]), from within a corporation (e.g., [18], [19]), from within a multinational corporation group (e.g., [11], [20]), from within a strategic alliance (e.g., [9], [21]), from a franchise headquarters to franchisees (e.g., [22]), or from a manufacturer to suppliers (e.g. [23]).

As such, there is a paucity of studies on knowledge transfer by public organizations [24].

D. Limitations of Past Studies and Research Questions

In the previous sections, facts on knowledge transfer identified in past studies were reviewed. They were based on the fundamental assumption that organizations transfer knowledge driven by motivation with their own intention or will. In contrast, knowledge transfer may be explained as a result of institutional isomorphism, in which organizations are forced to resemble each other. It is foreseen that this could especially be the case for public organizations. This leads to the assertion that studies should be conducted on knowledge transfer by public organizations. However, there is paucity of such studies [24].

Under these circumstances, this study aims to analyze organizational knowledge transfer, including both public and private organizations, in the civil aviation domain. Hence, the following were the research questions:

RQ1: What difference exists between knowledge transfer by public versus private organizations?

RQ2: What are the drivers for knowledge transfer in the civil aviation domain, the organization's own will or coercion?

In the following chapters, an analysis is conducted to answer these research questions, with an actual case in the civil aviation domain.

III. Method

A. Research Site

In this study, as a case for knowledge transfer, the diffusion of an innovation of air navigation technology called PBN (performance-based navigation) was selected.

PBN is a new air navigation technology. PBN enables aircraft to fly on air routes with more flexibility than conventional navigation offers [25]. Refer to Fig. 1 for an illustration of PBN. PBN enables more flexible routes independent of the consternation of ground navigation facilities, in addition to improved navigation accuracy. Thus, PBN can improve airport and airspace capacity, safety, and airport accessibility [25].

However, as mentioned by an informant (discussed below), PBN itself is not a new technology; many aircraft currently operated by airlines already had the capability to fly PBN before the PBN concept was formalized. Therefore, it can be said that PBN is not a technical innovation but an administrative innovation [26]. By this interpretation, PBN is regarded as a series of formal institution to utilize an air navigation technology.

The main reason for selecting PBN as the subject of this study was the fact that PBN implementation involves both public and private organizations. In fact, the implementation of PBN involves a broad range of stakeholders. The public organizations involved include air navigation service providers (ANSPs), which provide route design and air traffic control on these routes, and state government authorities (the regulators that oversee both ANSPs and operators). Related private organizations include aircraft operators such as airlines and other types of service providers.

Aircraft operation involves flights across state borders. This requires that regulations and procedures for aircraft navigation be standardized throughout the world. Therefore, International Civil Aviation Organization (ICAO) establishes various global rules for air navigation, and each contracting state is required to adopt these rules as their domestic regulations. PBN implementation is one of these common practices. As such, organizations involved in PBN are highly interdependent and have to cooperate with each other.

Thus, the implementation of PBN is one of the best cases to examine knowledge transfer, suitable for comparing public and private organizations. PBN also provides data appropriate for analysis from the perspective of isomorphism because the magnitude of standardization is high owing to the nature of international civil aviation as described above. In addition, PBN is now being implemented by many states under the leadership of ICAO [27]. Therefore, it is possible to collect a wide range of data from various organizations and states.

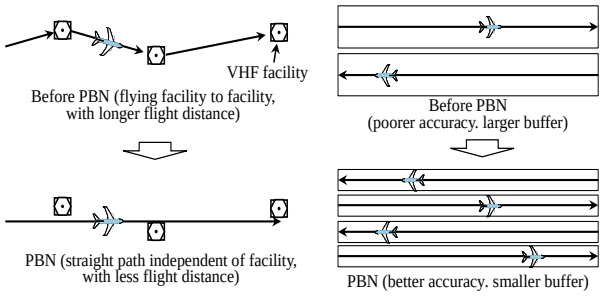

Fig. 1. Performance-based navigation (PBN).

B. Data Collection and Analysis

Data Collection: For data collection, the personnel in charge of PBN implementation were interviewed to collect data on PBN implementation activities at the related

organizations. Reflecting the range of stakeholders, as discussed above, informants were selected from various organizations including both public and private organizations. In addition, publications and other documents were referenced to supplement the interview data. The publications used for the study include ICAO's technical documents such as the PBN Manual [25] and other guidance materials issued by ICAO regional offices.

Informants were selected so that the data could cover a wide range of knowledge transfer process related to PBN implementation. The chosen informants represented public organizations such as air navigation service providers, government regulators, international organizations, an ODA (official development assistance) agency, and private corporations such as airlines and other types of aircraft operators. They reside in both of developed countries and developing countries. Their roles are as follows: planning / the execution of PBN implementation and the establishment of technical standards by government agencies, the establishment of flight route by air navigation service providers, the application of an operational approval to regulators and internal training by operators, and the project management of technology transfer program by ODA agencies.

In all, fifteen informants (I01 through I15) were interviewed, covering two international organizations and six countries. The number of informants (fifteen) was not predetermined; it was fixed during the analysis, upon reaching the situation of "theoretical saturation," [28] after which new important concepts could not be identified.

The interviews were semi-structured and conducted between August 2012 and June 2013 in English or Japanese. All of the questions asked in the interview were related to the hypothesis of this study. As far as possible, all of the interviews were recorded (with interviewee permission), except for I08 and I10, who denied permission to record their interviews. An interview with I11 through I14 was conducted as a focus group at their request.

The total time of interviews was thirteen hours. The author then analyzed the data to extract the elements related to knowledge transfer and grouped related elements into categories. As mentioned above, data collection and analysis were completed with the interview of I15, when it was determined that additional interview data would not provide additional information.

In addition to the personnel interviews, the author also interviewed eight participants in a technical meeting on the implementation of PBN, organized by an ICAO regional office. The pool of eight participants covered seven countries and one international organization. The central questions were the same as those in the main interviews; however, the comments of each participant were gathered in a short period of approximately ten minutes respectively because of time constraints. These additional data helped to validate the data collected from the main interviews.

Analysis: The modified grounded theory approach (M-GTA) was used to analyze the data [29]. M-GTA is a variation on the methodology of the grounded theory approach (GTA) [28]. Whereas GTA has been applied in various management studies (e.g., [30]), it is said that M-GTA is suitable for analyzing interview data among others [29].

IV. Results

As a result of the analysis, various motivations were found for the implementation of PBN, as shown in Table I below.

TABLE I: Motivation for Knowledge Transfer

Motivation	Public Organizations	Private Organizations
Public Interest	- Environment (reduction of fuel consumption, CO2 emission, noise) - Benefits by stakeholders (regularity of operation, cost reduction) - Safety	- Same as for public organizations but often rather as an expedient
Own Interest	- Cost reduction (for the operation of facilities)	- Cost reduction (fuel, flight time)
Coercion	- Policy by organizations higher in the hierarchy (such as by ICAO) - At the request of stakeholders (operators, neighboring states, etc.)	- Virtual coercion (no other choice because of the abolishment of conventional methods, disadvantage because of not implementing new method, etc.)

For both types of organizations, as in Table I, the main motivations are summarized as public interest, the organization's own interest, and coercion. However, if we observe them carefully, public organizations and private organizations have different motivations, as discussed below.

A. Public Interest

For the majority of public organizations, public interest is mentioned as the most significant motivation for the implementation of PBN. For example, I08, a government officer, mentioned their motivation for, or the objectives of, PBN implementation directly as follows. (Note that, in interview data, words in ( ) have been added by the author to supplement the comments.)

I08 "Motivations for the implementation of PBN is safety, efficiency and regularity of aircraft operations, reduction of workload of ATC (air traffic controller) and pilot, economic benefit of operators, reduction in CO2 emission, etc."

What is important here is that these motivations were oriented to the benefit of the other party, not their own. This direction is summarized in the following comment:

I08 "Implementation of PBN will not contribute to the benefit of our own organization. However, our Civil Aviation Act says its objective is the improvement of public interest by facilitating civil aviation. And it touts improvement of safety and stakeholders' benefit as the means to achieve the objectives."

Informants from private organizations also mentioned public interest as their motivations. However, the stances on public interest were more or less different between public and private organizations, as in the comment by I10, technical personnel for airline.

I10"Objective (of the implementation of PBN) is CO2 reduction, fuel reduction and so on. Talking about CO2

reduction and noise reduction, they give a good image for the public. However, company cannot move only for such reasons. We will be asked by the management 'Are you going to spend money for this?' But for fuel reduction, the management will say 'Let's go!'"

As implied by this comment, private corporations use public interest rather as an expedient. This could be quite natural because private corporations have to be oriented to their own economic interests in order to survive.

B. Own Interest

Of course, organizations' own interest or benefit is also significant motivations. Informants from public organizations also mentioned cost reduction as one of the main drivers for the implementation of PBN. For example, air navigation service providers can reduce costs for the operation and maintenance of ground navigation facilities by implementing PBN.

Moreover, private organizations such as airlines can enjoy economic benefits from PBN. One important aspect of PBN is that, in general, airlines do not have to invest in new onboard equipment because most of them already have modern aircraft equipped with navigation systems suitable for PBN. They can fly PBN without significant investment, although other costs for crew training, applications for approval, etc. are still needed. This fact indicates that PBN is not a technical innovation but an administrative innovation that uses existing technology [26]. A comment by I09 indicates this situation.

I09 "Progress of technologies for aircraft is far beyond the rules. Many modern aircraft have been manufactured and are flying now. And we bought such aircraft and brought them into actual operations. So, as we already have such things, why don't we use them? We can make maximum benefit of then and we can reduce cost."

C. Coercion

In addition to organizations' own intentions for the public or their own interest, there are some signs that they are being forced to implement PBN by their environments. As such, it was found that the implementation of PBN can be regarded as a kind of coercion as follows.

Public organizations at ICAO level (the worldwide level), there are no absolute rules or regulations that mandate states to implement PBN. What exists in civil aviation is ICAO assembly resolution [31] and regional planning documents ([25], [27]). It is to be noted that ICAO assembly resolution is not a mandatory rule directing contracting states. It rather has the nature of recommendations.

However, comments by informants from government agencies imply the existence of some kind of coercion. I03, a government officer, mentioned a kind of pressure from ICAO regional office.

I03 "Actually, it (government policy to implement PBN) came from a letter from ICAO regional office requiring states to submit the implementation plan and it has a definite deadline. That was the starting point. … Yes, that was the initiative. That initiative compelled us to develop the plan (for PBN implementation)."

Pressure on government agencies also comes from other parties. I07, a government officer, mentioned pressure from stakeholders in addition to the ICAO resolution as follows: (Note that, in interview data, some proper nouns in informants' comments have been replaced by common nouns in [ ] by the author for anonymity):

I07 "In fact, [Name of organization the interviewee belongs to] decided to implement PBN with two main – the first one was there is an ICAO resolution. The resolution - I don't remember the name - saying you should implement PBN. The other point is … there are pressures from the airlines to implement PBN."

This is not an order or pressure from a higher organization, but it could become a kind type of coercion depending on the relationship between these organizations. Similarly, I15 suggested that there is pressure from neighboring states. This is because the specifications of some types of PBN en-routes airways (high-altitude air routes for cruising) must be harmonized between neighboring states to eliminate discontinuity and inconsistency in flight operation and air traffic management and to achieve maximum benefit with safety.

I15 "I think the purpose or reason for the implementation (of PBN) is requests from surrounding states and regions, and ICAO. Talking about this region, [names of three states surrounding the state I15 is working for] already have implemented PBN. However, [name of three states which the ODA project I15 is engaged in are treating] have not, and these states are like vacuum. So, maybe pressure from surrounding states for early implementation of PBN was strong. Also they must have pressure from airlines as well, I think.

As described above, government agencies are also exposed to pressure from the environment.

Private organizations: As far as the author is concerned, there is no state where aircraft operators are mandated to implement PBN by law or regulations. However, in some situations, they are compelled to implement and fly PBN because of some reasons.

These situations include the abolishment of conventional routes upon the implementation of PBN. In such cases, aircraft operators without PBN have to make detours because the shorter routes are now supported only by PBN.

I11 "Yes, we were compelled to do that. It is especially because the government started planning of the decommissioning of VOR (facility forming conventional route). We would not be able to fly if we did not start action. However, fortunately, our aircraft have already had capability. So, we said 'Do it now!'"

Similarly, some aircraft operators are forced to implement PBN. For example, in Europe, operators must comply with B-RNAV (a type of PBN) to fly in upper airspace. Therefore, aircraft without PBN have to fly in lower altitude where aircraft consume more fuel.

In these two cases above, there are some ways to waive the

implementation of PBN even with a disadvantage. In contrast, in Hong Kong, the Civil Aviation Authority tried to mandate PBN on airlines flying into Hong Kong International Airport. However, the original goal has not been achieved as of October 2013. Most of the aircraft flying into Hong Kong already has the capability to fly PBN for terminal operation. However, operators also have to be approved by its own state (not from the Hong Kong government) to fly PBN, and some of these state governments have not established this system or its capability for approval process. Finally, at the request of major airlines, the Hong Kong government postponed mandating PBN in its airspace [32].

In the cases mentioned above, it can be said that there exists vertical (*de facto*) coercion; aircraft operators are forced to implement PBN.

However, in some cases, this coercion was utilized as a useful tool; personnel and operational divisions of aircraft operators utilize such pressure as a rationale, or excuse, to persuade managerial or financial sections when they wish to obtain the budget to implement PBN.

I11 "Decommissioning of conventional route is sometimes helps us. We say 'We need to buy this, otherwise we have such disadvantage.' For example, we persuaded our management to buy IRS (inertial reference system: a kind of onboard navigation system) for oceanic flight because we want to have it as GPS is unreliable. So, we explained why we need IRS in case of loss of GPS in oceanic flight, and helped them understand the situation."

In these situations, coercion is not only coercion itself. Rather, it provides a good excuse or a tool for some part in an organization to achieve their goal.

V. Discussion

This chapter intends to extend the discussion by elaborating the results of the analysis above and by comparing it with the assertions of past studies.

A. Different Motivations between Public and Private Organizations

It was found that the motivations for the implementation of PBN are different between public organizations and private organizations.

Public organizations are oriented toward public interest as their reasons for existence. Their primary motivations for implementing PBN were mainly focused on the public interest, such as environmental issues and safety. They also aimed at improving the benefit of stakeholders such as airlines by providing means for them to reduce costs. Although public organizations also regard cost reduction as the outcome of the implementation of PBN, it is rather a secondary effect.

In contrast, private organizations are oriented toward their own interest. By implementing PBN, they can reduce flight distance, which leads to the reduction of fuel consumption and variable costs such as personnel expenses for crew and aircraft maintenance. Although they also tout public interest as the objective of the implementation of PBN, it is rather used as an expedient.

Thus, it was found that there are clear differences in the motivation for knowledge transfer between public organizations and private organizations.

B. Diffusion of Innovation as Coercive Isomorphism

In addition to the motivations described in the previous sections, both public and private organizations are forced to implement PBN with pressure from the environment.

According to the data, public organizations such as state government agencies are forced to implement PBN in order to respond to the pressure from organizations at higher levels in the hierarchy, such as ICAO, or to meet requests by surrounding states and other stakeholders.

Private organizations such as aircraft operators are also forced to implement PBN in some cases. This is not a direct obligation by law or regulation. However, it is a kind of indirect virtual compulsion. For example, because airlines without PBN cannot fly upper airspace in Europe, they have to fly lower airspace, putting up with the burden of increased costs for more fuel consumption.

As such, in some cases, both public and private organizations may transfer knowledge regardless of their motivation.

It is to be noted that the factors that lead to unintended knowledge transfer are similar to the factors that enhance coercive isomorphism.

Organizations in the civil aviation domain are regulated by higher-up organizations. This is owing to the industry's nature that rules and practices must be uniform for the safety of international aircraft operations. The contracting states of the Convention on International Civil Aviation (Chicago Convention) [33] have the responsibility to comply with rules provided in the Annexes to the Convention. Also at the state level, aircraft must be operated under regulations provided by the state that are compatible with international rules.

This is related to the nature of the shared use of airspace and air routes; traffic rules must be unified in a given airspace. Once an administrator of the airspace (normally, a state government or ANSP to which the responsibility is delegated by the government) determines a rule, airspace users (aircraft operators) must implement the knowledge, procedures, and equipment needed to comply with it. Through this process, aircraft operators in an organizational field come to possess similar knowledge and come to resemble each other.

As such, the phenomenon of knowledge transfer can be explained by the framework and perspectives of coercive isomorphism.

VI. Conclusion

A. Findings

The theoretical findings of this study are as follows.

First, this study found that the main motivation of public organizations is public interest. This indicates a significant difference between public and private organizations because the main motivation of private organizations for knowledge transfer is economic benefit for themselves. Private

organizations may also tout public interest as their motivation. However, as addressed by informants, this is rather an expedient.

Second, this study found that the process of knowledge transfer for the diffusion of innovation can be explained as coercive isomorphism. This provides another explanation for knowledge transfer, explaining why the same technologies are adopted by many organizations.

B. Implications for Further Studies

This study provides a new perspective on knowledge transfer from the perspective of institutionalism with the concept of institutional isomorphism.

In order to enhance the discussion, more studies should be conducted to compare knowledge transfer between public organizations and private organizations. For this purpose, a variable expressing the extent to which organizations are institutionalized should be incorporated into analysis models, and the variable's effect on knowledge transfer should be examined.

C. Limitations

In addition to the findings above, however, this study has limitations. It is still an explanatory qualitative study mainly based on interviews with a limited number of informants. Therefore, the validity of the findings should be tested by conducting additional empirical studies utilizing quantitative analysis. In addition, because this study was conducted in the single research site of civil aviation, the findings should be tested in other industries to ensure their validity.

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